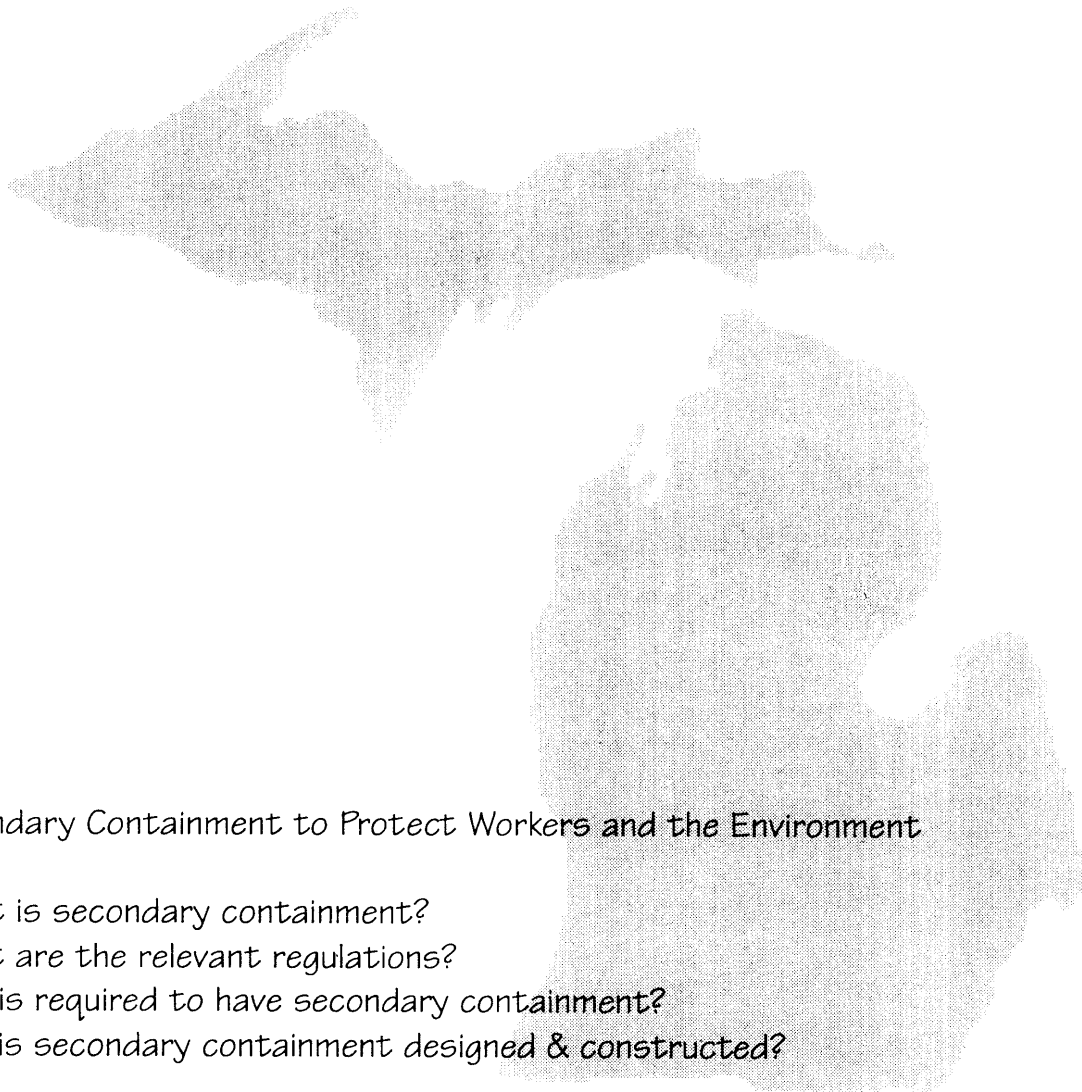


# Guide to Understanding Secondary Containment Requirements in Michigan

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## Secondary Containment to Protect Workers and the Environment

- What is *secondary containment*?
- What are the relevant regulations?
- Who is required to have *secondary containment*?
- How is *secondary containment* designed & constructed?



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# GUIDE TO UNDERSTANDING SECONDARY CONTAINMENT IN MICHIGAN

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## SECONDARY CONTAINMENT

### What is secondary containment?

Secondary containment is a second barrier or an outer wall of a double enclosure which will contain any leak or spill from a storage container. Secondary containment helps protect the surface water, groundwater, and soils and reduce worker exposure to regulated substances. This enclosure is usually needed wherever regulated substances are being handled and stored in tanks, totes, drums, small pails, or other containers.

Secondary containment systems can be very simple or complex. The containment area may be in a detached shed or building, an open area outdoors, an underground vault, in a separate room, or in a dedicated portion of a larger space. It may include liquid-tight storage cabinets, berms, curbs, sills, sunken floors, special liners, drip pans or buckets, double-walled tanks, or other structures. Containment systems can be purchased as ready-made units or custom built on site.

The various statutes and rules define regulated substances differently. Substances may be regulated if they have been included on regulatory lists or by their flammability, corrosivity, reactivity, and/or toxicity characteristics. These substances can be found in ingredients, final products, or wastes.

Some regulations require additional protective measures besides secondary containment. For example, the underground storage tank regulations require release detection along with spill, overfill, and corrosion protection. Know what is required for the storage of the materials you have on-site.

Without adequate secondary containment, environmental contamination may result from improper handling, accidental leaks, spills, and overfills. Contamination may occur anywhere on your property but some common locations include the following:

- Floor and storm drains.
- On-site septic systems.
- Cracked floors and improperly sealed containment vaults.
- Loading and off-loading areas including the dock area and locations having spigots, hose connections, etc., used to transfer materials.
- Metallic chip dumpsters and other waste storage areas.
- Product storage areas including tanks and associated piping.
- Areas where exhaust fans are located (due to condensation and dripping).

If you have contamination on your property, you must properly report it when required, and clean it up to reduce risk to public health and the environment.

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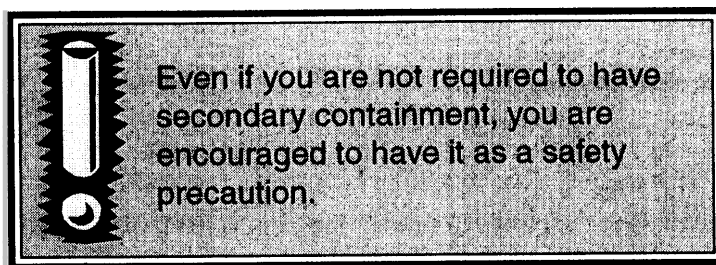
## What are the benefits of having adequate secondary containment?

- J Reduces disposal costs
- J Reduces workplace hazards from spills
- ✓ Protects plant assets
- J May increase resale value of property
- J Enables material recovery or reclamation
- J Reduces the facility's liability risk
- J Lowers cleanup and maintenance costs
- J Prevents soil, surface water, and groundwater contamination (avoids contaminated drinking wells, fish kills, and other negative impacts)
- ✓ Complies with regulations
- J Potentially lowers insurance premiums (some insurance companies may require it)

## Is your company or facility required to have secondary containment?

The answer is probably yes if you have any of the following regulated substances:

- Flammable and combustible materials
- Hazardous substances
- Hazardous waste
- Materials included on the federal CERCLA list
- Materials included on the state Critical Materials Register
- Oil and other petroleum-based products or waste
- Salt (calcium chloride and sodium chloride)



Although most hazardous substances and polluting materials are liquid, some solids have also been linked to environmental contamination incidents. The regulatory requirements and the agencies which oversee those requirements vary with the type and volume of material you have. Those different regulations may

use another term in place of secondary containment. These terms include containment system, diked area, emergency containment structure, impoundment, vault, or spill containment.

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## What are the regulations that address secondary containment?

The following table summarizes secondary containment regulations. It is required by several state and federal laws and regulations, depending on the type and quantity of hazardous substances stored. In addition to the state and federal regulations, you may have local requirements that are not discussed in this publication. Local requirements are often incorporated into zoning, building, or fire protection regulations.

The following brief explanation is for those readers unfamiliar with reading regulations. Federal regulations will be preceded by a number, followed by CFR which stands for Code of Federal Register, and then the Part number. Environmental federal laws include “40 CFR” in their citation. Usually they are overseen by the Environmental Protection Agency (EPA) unless that agency has given the state(s) authority to implement the program. In this document, citations for state laws include the year it passed, followed by PA for Public Act, and then the act number. Rules promulgated under state law start with an “R” in their citation. Many of Michigan’s environmental laws have been included in the Natural Resources and Environmental Protection Act (1994 PA 451, as amended) and renumbered with a “Part” number. The rules may still refer to the old act number but are being updated to the new act citation when revised.

**You may have substances that are regulated by more than one agency and under different regulations.** For example, oil is regulated by the DEQ, Fire Marshal, and the US EPA. **In those situations, you will need to incorporate the most stringent requirements in your secondary containment system.** It is highly recommended that you contact all the involved agencies and, if necessary, schedule a joint meeting to discuss what would be best for your situation.

The regulations overseen by the DEQ are described in more detail after the summary table. Information on how to get the DEQ regulations are on page 30.

## SUMMARY OF SECONDARY CONTAINMENT REGULATIONS

The material you have may be regulated by more than one agency and therefore, listed in more than one row of this table. Due to limited space, not all of the requirements are explained. If you have any questions on how substances are regulated, contact the appropriate agency for their specific requirements. The bullets in the individual columns do not correspond with bulleted information in the other columns of that row. The bullets are only used as an indicator for another point.

REGULATED SUBSTANCES	REGULATED STORAGE VOLUMES	REQUIRED CONTAINMENT VOLUMES	REGULATION REFERENCE	AGENCY WITH REGULATORY RESPONSIBILITY
Cyanide	*All surface-coating operations	*Dikes or other arrangements must be provided to prevent the possibility of intermixing of cyanide and acid in the event of tank rupture	♦1974 PA 154, as amended; and Rule 3220, "open-surface tanks"	♦Dept. of Consumer and Industry Services, Bureau of Safety and Regulation (MIOSHA <sup>1</sup> )
Flammable and combustible liquids (class I/II/III A) where flashpoint (FP) is less than 200°F	♦AST <sup>2</sup> 1,100 gallons or larger capacity *Storage capacity of greater than 660 gallons of combustible liquids *Any size container holding flammable liquids requires diking ♦Any container less than 660 gallons capacity if secondary containment is determined to be necessary by authorities	*Volume varies with amount stored and fire protection level: indoor/outdoor restriction; distance requirements between tanks, buildings, and property lines; aisle width between containers; etc. *Tanks must be in an area capable of containing 100% volume of the largest tank, plus the volume occupied by other tanks in the same area measured from the height of the dike wall *At least 4" sill height or sunken floor for inside storage room or use of open-grated trench *At least 6" curb height for outside storage area or sloped away from building	♦1941 PA 207, as amended; and Michigan Storage and Handling of Flammable and Combustible Liquids (FUEL) Rules	♦DEQ, Underground Storage Tank Division  NOTE: This program was transferred from the Dept. of State Police, Fire Marshal Division to DEQ on 10/1/97.  *Local authority (e.g., Fire Marshal or Fire Chief)

<sup>1</sup>MIOSHA - Michigan Occupational Safety and Health Act

<sup>2</sup>AST - Aboveground Storage Tank



REGULATED SUBSTANCES	REGULATED STORAGE VOLUMES	REQUIRED CONTAINMENT VOLUMES	REGULATION REFERENCE	AGENCY WITH REGULATORY RESPONSIBILITY
Flammable and combustible liquids, including flammable aerosols	*Varies with container type and class of material, and whether material stored indoors or outside; limits how much material can be kept in storage cabinets	*Storage room size varies with amount stored and fire protection rating--see MIOSHA document OSC-113 ♦AST requirements: See R 408.17501(b)(1)(vii) and 29 CFR 1910.106 Part 75(b)(2) *At least 6" outdoor curb height [29 CFR 1910.106(d)(6)(iii)] *At least 4" sill height or sunken floor for inside storage room [29 CFR 1910.106(d)(4)(i)]	♦1974 PA 154, as amended; and Part 75 Flammable and Combustible Liquid Rules; along with federal safety standard 29 CFR 1910.106	♦Dept. of Consumer and Industry Services, Bureau of Safety and Regulation (MIOSHA)
Hazardous chemicals where flashpoint (FP) is less than 200° F (includes explosives, blasting agents, poisons, poison gas, oxidizers, organic peroxides, irritating materials, radioactive materials, corrosives, and carcinogens)	*Varies with chemical type and if a liquid, solid, or gas	♦Volume varies with type and quantity of chemical, how and where stored *At least 4" sill height or sunken floor for inside storage room or use of open-grated trench *At least 6" curb height for outside storage area or sloped away from building	♦1941 PA 207, as amended; and Michigan Storage and Handling of Flammable and Combustible Liquids (FUEL) Rules	♦DEQ, Underground Storage Tank Division  NOTE: This program was transferred from the Dept of State Police, Fire Marshal Division to DEQ on 10/1/97  *Local authority (e.g., Fire Marshal or Fire Chief)

REGULATED SUBSTANCES	REGULATED STORAGE VOLUMES	REQUIRED CONTAINMENT VOLUMES	REGULATION REFERENCE	AGENCY WITH REGULATORY RESPONSIBILITY
Highly hazardous chemicals listed in Appendix A to 29 CFR 1910.119	*At or above the threshold quantity specified in Appendix A to 29 CFR 1910.119	*Varies with physical and chemical characteristics of the hazardous chemical	♦ 1974 PA 154, as amended; and 29 CFR 1910.119, "process safety management of highly hazardous chemicals"	♦ Dept. of Consumer and Industry Services, Bureau of Safety and Regulation (MIOSHA)
Hazardous waste  (includes <b>both</b> listed and characteristic wastes)	<ul style="list-style-type: none"> <li>♦ SQGs<sup>3</sup> accumulating more than 1,000 kg (2,200 lbs.) of liquid hazardous waste</li> <li>♦ LQGs<sup>4</sup> accumulating any amount of hazardous waste</li> <li>♦ SQGs or LQGs accumulating any waste with codes FOX), F021, F022, F023, F026, F027</li> </ul> <p>*Anyone accumulating more than 1 kg (2.2 lbs.) of acute or severely toxic waste</p> <p>*Generators with regulated tanks</p> <p>♦ CESQGs<sup>5</sup> are not required to have secondary containment unless they accumulate &gt; 2,200 lbs. but they must manage the waste so there is no release into the environment, sewers, or drains</p> <p>*Treatment, storage, and disposal facilities and transporters have specific requirements</p>	<p>Capacity must be able to contain 100% of the largest container or 10% of the volume of all the containers in the system, whichever is larger, of liquid hazardous waste or those identified "F" code wastes plus any precipitation that gets in the accumulation area</p> <p>NOTE: Even if secondary containment is not required, it is recommended for all hazardous waste accumulation areas</p>	<p>*Part 111 of 1994 PA 451, as amended, and Rules; and Federal Resource Conservation and Recovery Act (RCRA) 40 CFR Parts 260 to 299</p> <p>NOTE: If you handle hazardous waste, you will also need to meet emergency notification and planning requirements.</p>	<ul style="list-style-type: none"> <li>♦ DEQ, Waste Management Division</li> <li>♦ U.S. Environmental Protection Agency</li> </ul>

<sup>3</sup>SQGs - Small Quantity Generators

<sup>4</sup>LQGs - Large Quantity Generators

<sup>5</sup>CESQGs - Conditionally Exempt Small Quantity Generators

REGULATED SUBSTANCES	REGULATED STORAGE VOLUMES	REQUIRED CONTAINMENT VOLUMES	REGULATION REFERENCE	AGENCY WITH REGULATORY RESPONSIBILITY
<p>Petroleum products (includes oil, gasoline, diesel fuel)</p> <p>Hazardous substances on CERCLA<sup>6</sup> list</p>	<p>*Regulated UST<sup>7</sup> located in an exclusion zone or secondary containment zone</p>	<p>*Requires double-walled tanks or integral secondary containment tanks</p>	<p>♦Part 211 of 1994 PA 451: as amended; and Michigan Underground Storage Tank Rules</p> <p>NOTE: These regulations are under revision</p>	<p>♦DEQ, Underground Storage Tank Division</p>
<p>Oil, if any discharge can reach navigable water</p> <p>(Oil means any kind or in any form including petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil)</p>	<p>♦If total storage capacity is more than 1,320 gallons</p> <p>♦If single AST storage capacity is more than 660 gallons</p> <p>♦If underground storage capacity is more than 42,000 gallons</p> <p>*If subject to 40 CFR 112, then the capacity of all containers is regulated</p>	<p>♦100% of the largest single tank plus sufficient freeboard to allow for precipitation</p>	<p>♦Spill Prevention, Control, and Countermeasure (SPCC) under the Clean Water Act, 40 CFR 112</p> <p>NOTE: If your storage capacity is regulated under these Oil Pollution Prevention regulations, then an SPCC Plan is required</p>	<p>♦U.S. Environmental Protection Agency</p>

REGULATED SUBSTANCES	REGULATED STORAGE VOLUMES	REQUIRED CONTAINMENT VOLUMES	REGULATION REFERENCE	AGENCY WITH REGULATORY RESPONSIBILITY
<p>Oil (means any kind and in any form including petroleum, gasoline, fuel oil, grease, sludge, oil refuse, and oil mixed with waste)</p> <p>Polluting materials listed on the Critical Materials Register</p> <p>Salt</p>	<p>♦Oil more than 40,000 gallons or less if required by DEQ</p> <p>*Any amount or concentration of material listed on the Critical Materials Register, including if it is an ingredient in the substances stored</p> <p>*Liquid salt</p> <p>*Solid salt stored longer than 15 days</p>	<p>Depending on the circumstances, a smaller containment volume than the following may be approved by the Waste Management Division district supervisor:</p> <p>♦Oil containment capacity: equal to or more than 100% of volume that could be released from a full single tank; see rule if multiple tanks [R 323.1156]</p> <p>*Polluting material containment: equal to or more than 150% of the volume stored [R 323.1158]</p> <p>*Liquid salt containment: capacity of equal to or more than 100% of volume that could be released from a full single tank; see rule if multiple tanks [R 323.1157(1)]</p> <p>*Solid salt: managed to prevent entry into water and stored not less than 50 feet from shore or bank of any lake or stream [R 323.1157(2)]</p>	<p>*Part 31 of 1994 PA 451, as amended; and the Part 5 Rules</p> <p>NOTE: If you have any of these materials stored, then a Pollution Incident Prevention Plan (PIPP) is required.</p> <p>These regulations are currently being reviewed for revisions.</p>	<p>♦DEQ, Surface Water Quality and Waste Management Divisions</p> <p>*County Health Department</p>

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## DEQ REGULATIONS EXPLAINED FURTHER

### ❖ **HAZARDOUS and UNIVERSAL WASTE**

REGULATED UNDER PART 111 OF 1994 PA 451,  
AS AMENDED, HAZARDOUS WASTE RULES, AND  
RCRA

These regulations are overseen by the Waste Management Division and the US Environmental Protection Agency. The hazardous waste regulations you must follow depend on if you are:

- A generator and how much hazardous waste you create in a month and accumulate at your facility [40 CFR 265.175 and R 299.93061;
- A transporter [R 299.9404 and 94051; or
- A treatment, storage, or disposal facility [R 299.9616, 9617, and 96201.

Your pertinent regulations also depend on if you are storing hazardous waste in containers or tanks, what those wastes are, and if those wastes are in a liquid or solid form [R 299.9614 and 9615, and 40 CFR 265.175, 265.191, 265.192, 265.193, and 265.1961. It may be difficult to quickly detect any leaks when using underground storage tanks to store hazardous waste. If you have tanks, or are a transporter, or treatment, storage, or disposal facility, discuss your requirements with the Waste Management Division district office staff.

#### **Generator Categories**

In ONE month, nonacute hazardous waste is generated at the following volumes:

**LQG:** more than 2,200 pounds and/or 2.2 pounds or more of acutely and severely toxic hazardous waste.

**SQG:** 220 pounds to less than 2,200 pounds. Accumulation never exceeds 13,200 pounds.

**CESQG:** less than 200 pounds. Accumulation never exceeds 2,200 pounds.

There are also accumulation time limits.

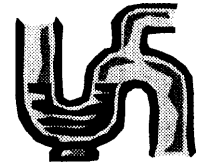
Large quantity generators (LQG) accumulating any amount of hazardous waste and small quantity generators (SQG) accumulating over 2,200 pounds of nonacute hazardous waste must have secondary containment for the following:

- Containers holding hazardous waste with free liquids
- Hazardous waste with the codes of F020, F021, F022, F023, F026, or F027
- Accumulation of more than 2.2 pounds of acute or severely toxic hazardous waste

The containment must be able to hold 100 percent of the largest container or ten percent of the volume of all the containers in the system, whichever is larger. You also have to include enough capacity to hold any precipitation that may accumulate in the containment area. *If you have hazardous waste in a solid form and it is not one of the above hazardous waste codes, the regulations do not specify a secondary containment volume.* Conditionally exempt small quantity generators (CESQG) do not have specific secondary

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containment requirements unless they accumulate more than 2,200 pounds of nonacute hazardous waste or 2.2 pounds or more of acutely and severely toxic hazardous waste. Their hazardous waste must be managed so there is no release into surface or groundwater, or into drains or sewers.



Large and small quantity generators are required to accumulate wastes in an area that is designed and operated to remove any spilled or leaked waste and accumulated precipitation in a timely manner to prevent any overflow of the system. The containers need to be elevated or otherwise protected from contact with any accumulated liquid [40 CFR 264.175].

In addition, large quantity generators are required to conduct weekly inspections of the accumulation area and keep written records for at least three years [R 299.9306(1)]. LQGs are also required to have a 50-foot isolation distance from property lines for ignitable and reactive hazardous waste storage [40 CFR 265.176].



*There are no specific secondary containment requirements for **universal waste** being managed under R 299.9228 unless there are signs of leakage, spillage, or damage to the container which could lead to leakage.* Those materials would have to be put in another container that prevents further release. **All** universal wastes need to be managed in a manner that prevents releases and immediately contains any release that does occur [40 CFR 273]. Universal waste includes batteries, electric lamps, mercury switches, thermostats and thermometers, other devices containing elemental mercury, and some pesticides.

❖ **OIL, POLLUTING MATERIALS ON THE  
CRITICAL MATERIALS REGISTER, AND SALT**

REGULATED UNDER PART 31 OF 1994 PA 451,  
AS AMENDED, AND SPILLAGE OF OIL AND POLLUTING  
MATERIALS PART 5 RULES

These regulations are overseen by the Surface Water Quality Division and the Waste Management Division. The rules apply to the following items at an oil storage facility or on-land facility:

- Oil (means any kind or any form, including petroleum, gasoline, fuel oil, grease, sludge, oil refuse, and oil mixed with waste) in volumes greater than 40,000 gallons unless the DEQ determines a lesser volume for a particular location due to environmental risk [R 323.1156 and R 323.1159(2)]. (If you have oil, also check if the federal SPCC and fire prevention requirements apply to your situation.)
- Polluting materials, in solid or liquid form, listed on the Critical Materials Register [R 323.1158]. This includes not only “pure” product or waste but also applies to materials included as an ingredient or component of another product or waste.

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- Currently there are no volume or concentration levels specified in the rules.  
Salt in liquid and solid form. Sodium chloride and calcium chloride in solid form are regulated under these rules if stored for over 15 days [R 323.1157]. Currently there are no volume or concentration levels specified in the rules.

An on-land facility includes any temporary or permanent location situated where any loss of oil or polluting materials could directly or indirectly reach surface or groundwater.

The Part 31 regulations do not include specific requirements on how the containment must be constructed, but it must be able to prevent any release into any sewer system or surface or groundwater. It does specify the capacity must be able to contain 150 percent of the **liquid polluting material** volume stored or used. A lesser amount can be approved by the Waste Management Division district supervisor. The regulations do not specify a containment capacity for **polluting materials in solid form**. However, they must be stored in an area that prevents the loss of these materials to any sewer system or to surface or groundwater. **Oil storage** facilities must have a containment capacity which will contain no less than the greatest amount of liquid that could be released from a single tank in the system. If more than one tank is in the containment area, then the capacity would also need to include the volume occupied by any additional tanks within the diked area in addition to the largest tank volume.

**Salt** in a solid form must be managed to prevent any runoff or seepage into the surface or groundwater. The Michigan Department of Transportation (MDOT) recommends that salt be stored indoors with a catch basin to collect any brine runoff. If you are connected to a municipal wastewater treatment system and **have their prior permission**, you may be able to discharge collected brine to that system. Otherwise, you will need to have a licensed hauler transport it to a disposal facility. Salt must be stored at least 50 feet from the shore or bank of any stream or lake unless the DEQ has approved a shorter distance. MDOT has staff available to assist municipalities who have maintenance agreements with that agency for **road salt** storage. Contact them at 517-322-3335.

If you have any of these regulated materials, you are also required to prepare a Pollution Incident Prevention Plan (PIPP) [R323.1162].

The Part 5 Rules are currently under review for revisions. Therefore, contact your Waste Management Division district office for current rule status.

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❖ **PETROLEUM PRODUCTS AND CERCLA  
HAZARDOUS SUBSTANCES STORED IN  
UNDERGROUND STORAGE TANKS**

REGULATED UNDER PART 211 OF 1994 PA 451,  
AS AMENDED, AND UNDERGROUND STORAGE  
TANK (UST) RULES

These regulations are overseen by the Underground Storage Tank Division. A regulated underground storage tank is defined as a tank or combination of tanks and underground connected piping that have at least ten percent of their volume underground and which are, were, or may have been used to contain a regulated substance. These substances include:

- Petroleum, such as gasoline, diesel fuel, and oil; and
- Any substance on the hazardous substance list in the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) such as, but not limited to, methanol, MTBE, and ethylene glycol.

Tanks not regulated include farm and residential tanks 1,100 gallons or less used for non-commercial purposes, tanks storing heating oil for consumptive use on the premises, and tanks with a capacity of 110 gallons or less. Check the regulations for additional exemptions.

You will be required to have secondary containment for your UST and piping if it presents an unacceptable risk of contamination to public health or the environment. Environmental areas of concern include aquifers used for drinking water, surface water, and habitats like wetlands. In addition, secondary containment *is* required under the following conditions:

- ✓ If there **is** a UST system containing hazardous substances [R 29.2123 Section 280.42(b)(1), (2), and (3)].
- ✓ If there is a new UST system located within a secondary containment zone which **is** the following distance parameters to a water well [R 9 Section 280.20 (d)(3)]:
  - More than 50 feet, but within 300 feet of a single family drinking well;
  - More than 75 feet, but within 800 feet of a type IIb noncommunity or type III public drinking water well; or
  - More than 200 feet, but within 2,000 feet of a type I community or type IIa noncommunity drinking water well or a public surface water intake location.

Existing tanks can be replaced by single-wall tanks in secondary containment zones under the state exception, “one-for-one replacement.”



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- ✓ If there is replacement of an active UST system located within an exclusion zone (which is the area less than the initial distance measurement given above for a particular well type). New USTs are prohibited in this zone [R 9 Section 280.20 (d)(1)].
  - ✓ Proposed rule changes may also require double-wall tanks installed in wellhead protection areas and secondary containment requirements for all new pressurized piping.

Double-walled tanks and piping, integral containment systems, or other methods like vaults may be used for secondary containment. Integral containment systems include steel tanks with a fiberglass jacket with a sensor between the tank wall and jacket to indicate if any leaks occur. If you are considering an alternative method, you are required to demonstrate that it will be effective and receive prior approval by the DEQ Underground Storage Tank Division. All secondary containment methods must be able to contain a release from the inner tank and piping. It is necessary to check the containment at least once every 30 days for evidence of a release. In addition to secondary containment requirements, there are also release detection, spill and overfill protection, and corrosion protection requirements. Talk to your DEQ Underground Storage Tank Division district office staff for information on these requirements.

❖ **FLAMMABLE AND COMBUSTIBLE LIQUIDS  
STORED IN ABOVEGROUND STORAGE TANKS  
AND STORAGE LOCKERS**

REGULATED UNDER 1941 PA 207, AS AMENDED, AND  
STORAGE AND HANDLING OF FLAMMABLE AND  
COMBUSTIBLE LIQUIDS CODE

The oversight responsibility for these regulations was transferred to the DEQ, Underground Storage Tank Division from the Michigan State Police, Fire Marshal Division on October 1, 1997. **All storage areas must be designed and capable of preventing any liquid spillage from entering a public sewer, the groundwater, surface water, or subsurface soils.**

Secondary containment is required for the following:

1. Aboveground tanks with a capacity greater than 660 gallons holding flammable and combustible (class I/II/IIIA) liquids [R 29.4209 Section 2-3.3.1]. This can be accomplished by meeting any of the following:
  - ✓ Directing any spill or precipitation to a remote impoundment area that is liquid-tight, has a capacity of at least the largest tank, and meets all the rule requirements regarding location, slope, construction, etc. [R 29.4209 Section 2-3.3.2].

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- ✓ Providing diking around the tanks that is liquid-tight and meets all the rule requirements regarding location, slope, construction, etc. [R 29.4209 Section 2-3.3.3].
  - ✓ Using secondary containment by other methods capable of holding 100 percent of volume of largest tank and meets all the rule requirements regarding construction, etc. [R 29.4209 Section 2-3.3.4].
  - ✓ Installing the tank within vaults as long as each tank has its own vault, is liquid-tight, and meets all the rule requirements [R 29.4219 Section 2-13.1].
  - ✓ Installing the tank in a special enclosure [R 29.4303 Section 2-21].

Authorities may require secondary containment for tanks less than 660 gallons if determined to be necessary [R 29.4209 Section 2-3.3.3].

2. Outside portable container storage areas must either be graded to divert spills away from the building or be surrounded by at least a six-inch curb [R 29.4234 Section 4-8.3].
3. Storage lockers located outside must have a containment system that is able to hold at least ten percent of the locker volume or the volume of the locker's largest container, whichever is greater [R 29.4235 Section 4-9.2.5].
4. Storage lockers located inside must be liquid-tight [Chapter 4-4 of Code].
5. Tank-vehicle and tank-car loading and unloading areas must have any drainage connections equipped with a separator box for temporary storage of spilled liquid or an equivalent method to prevent discharge to the sewer or other environmental receptor [R 29.4238 Section 5-4.1.13].
6. **All** facilities where flammable and combustible liquids may leak with emergency drainage systems must be equipped with traps or separators [R 29.4237, Section 5-3.4.2].

Contact staff at the appropriate agency to discuss the specific requirements for your situation.

### **How is secondary containment designed and constructed?**

Many options exist for designing and constructing secondary containment systems. Size, function, reliability, safety, and accessibility are all basic considerations for the design of containment systems. You need to consider a number of factors when determining which system would be best for your situation.

- 
- ☒ What will you be storing?
  - ☒ How much will be stored?
  - ☒ How long will it be stored?
  - ☒ What are the storage containers?
  - ☒ Are the substances being stored compatible with each other?
  - ☒ What is your company's physical layout?
  - ☒ How will materials be moved in and out of the area and who will be doing the work?
  - ☒ **Is** it necessary to have permanent or temporary storage?
  - ☒ Would drip pans, enclosed cabinets with sealed flooring, or portable containment units like plastic pallets with sumps meet your needs, or do you need a large storage room?
  - ☒ Will the containment area be inside or outside?
  - ☒ **Is** this an area where material will be transferred from a truck or between different containers?
  - ☒ What, if any, are the specific regulatory requirements?

### **Design Considerations:**

To assure that the containment system serves the purpose of preventing leaks or spills, the following should be considered when designing the system:

**Size:** The containment area must be large enough to meet the regulatory volumes specified for the type of material stored. Sill or curb height and storage room size requirements for flammable and combustible liquids are specified in those applicable regulations. In addition, those standards restrict dike height around tanks and include dimensions and slopes for earthen wall dikes.

The calculations needed to determine adequate volume of the containment area vary with the different regulations. Check the regulations for the specific requirements. To determine your general empty containment volume in cubic feet, multiply the width by the length of the storage area floor by the height of the dike/sill/curb.

$$\text{Width} \times \text{Length} \times \text{Height} = \text{Cubic Feet}$$



To convert this number from cubic feet to gallons, multiply it by 7.48.

$$\text{Cubic Feet} \times 7.48 = \text{Gallons}$$

This calculation, however, does not address displacement volumes of the containers stored in the containment area nor any ramps or other construction which affects the volume. See page **24** for examples of calculating size.

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***Squirting Liquids Control;*** The secondary containment area needs to be designed so that squirting liquids will be captured and retained within the system if a container ruptures. This can be done by providing adequate space so the containers are not placed close to the outside walls of the system. A general rule of thumb for determining squirt distance is to measure the tallest height of the containers and use that measurement as the minimum distance between the stored containers and the edge of the containment area. Splash guards or baffles may also be attached to the walls to extend the height of the wall to prevent squirting outside of the system. Depending on the material stored, these may be made out of plastic, fiberglass, concrete, or metal. If you are considering using ready-made units, be aware that some units, like spill control pallets, may not have adequate squirt protection. Spill control pallets used when storing liquid materials will not be acceptable for compliance with some regulations. Oversized containers that hold smaller primary containers are also available for secondary containment.

***Structural Strength:*** The base and walls must be sufficiently strong to support the weight of all loads that will be placed in the system, including all materials and equipment placed within. The system needs to be constructed of long-lasting materials that can withstand weathering effects and wear and tear, and be able to withstand a full hydrostatic head. Sealed, reinforced concrete is normally a strong and long-lasting material. Nonreinforced concrete can be used in some situations for low curbing and small areas but is not recommended because of its inability to withstand heavy loads and long-term use. Nonreinforced concrete is also subject to cracking. Asphalt may be used in low dikes or curbing for some systems but is not recommended. It deteriorates with age, freeze-thaw cycles, is easily damaged, and is subject to severe cracking.

***Impermeability and Compatibility;*** The system must be free of cracks and gaps. Walls and floors of the area must be of a liquid-tight construction. Side walls should be integrally constructed or keyed onto the floor. All the joints and cracks need to be caulked or coated. The surface of the system must be resistant to penetration by materials stored there and be compatible with those materials. The structure must be made of noncombustible materials if flammable or combustible materials are stored in the area. Poured concrete, concrete block, welded steel or aluminum, fiberglass, plastics, and earth have been used for constructing containment systems.

Concrete's permeability varies with the mix of concrete, percent of Portland cement, water, and other aggregate materials. Air entrainment in concrete mix will also impact its permeability. Asphalt must not be used for areas containing substances, like solvents or oils, that can dissolve the asphalt. It may be necessary to install a liner or seal the containment surface with epoxy or another type of coating. For example, acids or corrosives should not be contained in concrete systems unless the area has been coated or lined to make it resistant. It may be necessary to reapply the sealant if it becomes worn or replace the sealant if the stored material changes and the original sealant is no longer effective. One visual way to determine if a sealant is intact is by applying the coating layers

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in contrasting colors to easily reveal damage. When selecting a sealant or liner, consider the following:

- ✓ How compatible is the liner with what you will be storing?
- ✓ How quickly will the material seep through the liner — what is its permeation rate?
- ✓ How does the liner withstand weather conditions — how resistant is it to the sun, heat, cold, and precipitation?
- ✓ What are the methods for repairing or replacing the liner, if needed?
- ✓ What is the manufacturer's warranty for structural strength and impact resistance?

Consider if you have incompatible substances that need to be transferred or stored when designing and constructing your secondary containment. It will be necessary to separate incompatible materials from other materials by means of a dike, berm, wall, or other device.

**Integrity:** The containment structure must be built so any leaking materials are unable to release into the environment or sewer systems. Side walls and the base should not be penetrated by drains, piping channels, or openings of any kind where liquids may escape. If drains or openings exist, any discharges into them must be manually controlled. Joints and cracks must be sealed. Concrete blocks are not reliable construction materials because they are difficult to seal. In addition, they are subject to severe cracking in the mortar between the blocks, and the blocks themselves are porous.

**Precipitation Management:** Any containment system outdoors needs to include a large enough volume to allow for any precipitation (rain, snow, and stormwater run-on) that may enter the structure in addition to the required containment volume for stored materials. This additional capacity is calculated by using the 25-year, 24-hour storm event. In Michigan, this event varies from 3.5 to 4.5 inches of rainfall. If your secondary containment is indoors, you will not need to have additional volume to address precipitation. There are regulations, however, which do not allow indoor storage of some materials. In addition, the fire regulations may limit roof and other construction over flammable and combustible material storage areas.

Containers must be elevated or protected from contact with any accumulated liquid or the base should be sloped to direct liquids away from the containers. Precipitation must be removed from the sump or collection area in a timely manner to prevent overflow of the containment system. The use of gravity drains to remove liquids is not allowed. Pumps should be manually operated. Do not use automatic sump pumps. Two other factors to consider:

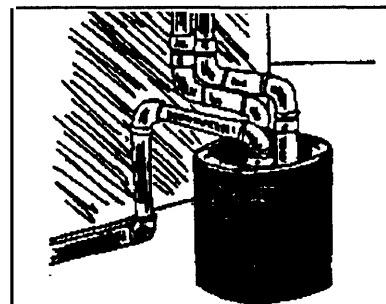
1. If the collected precipitation is contaminated with any spilled waste, the mixture might be considered a regulated hazardous waste and would then need to be handled according to Part 111 of 1994 PA 451.

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2. If the accumulated liquid is not a hazardous waste, it must be handled either as a liquid industrial waste under Part 121 of 1994 **PA** 451 or be discharged according to Part 31 of 1994 **PA** 451. This includes discharging to a sanitary sewer if you have **prior permission** from the wastewater treatment authority or have obtained a permit to discharge from DEQ.

Floor drains are strongly discouraged in areas storing hazardous substances. In many situations, floor drains would be prohibited. If there is a drain in any area, however, then the drain must meet one of the following:

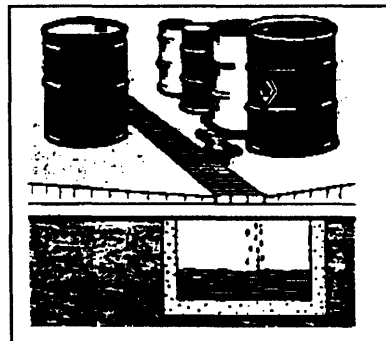
1. Be connected to a sanitary sewer by permission of the local wastewater authority; or
2. Be connected to a holding tank and the wastewater and sludge is pumped out by a licensed hauler; or
3. Have a discharge permit from the DEQ. This permit would be issued by the Surface Water Quality Division if the discharge is to a surface water, or by the Waste Management Division if the discharge is to the groundwater. Permits may not be issued for drains in certain cases. Discuss your situation with the appropriate DEQ division for more information.

Use nonshrink grout or nonshrink concrete to seal off floor drains. Removal of the drain pipe is recommended, especially if it is polyvinyl chloride (PVC), before plugging the drain. If you have a permissible floor drain, you may want to surround it with a riser to prevent any spills or unintended discharges from reaching the sewer system. **Also** keep absorbents or blocking devices like portable berms nearby to use if necessary to quickly seal off a drain.



In addition to addressing weather conditions, you will need to meet any fire protection regulations which require you to have a drainage system. If required, this system would have to have sufficient capacity to handle sprinkler water and other water from fire protection efforts. This can be accomplished by using a special drain or scupper. A scupper is an opening that lets water run off a floor. If you have a special drain or scupper, you may need to have additional secondary containment for runoff. Discuss the fire protection requirement with the local fire marshal, wastewater treatment plant authority, and the DEQ Waste Management Division district office staff.

Sumps or open-grated floor trenches incorporated into the design are helpful in the removal of accumulated liquids. The use of sumps instead of underground piping and holding tanks has the following advantages:



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- ✓ Easier to inspect for structural damages;
  - ✓ Easier to repair any damages; and
  - ✓ Easier to detect any releases.

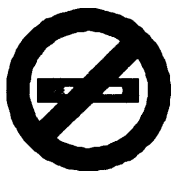
Pumps should be manually controlled and be appropriate for the type of material being removed.

**Long-Term Maintenance:** It is not enough just to install secondary containment. You must also make sure it is functioning properly. Conduct routine inspections, have maintenance programs, and make any necessary repairs. Perform any tank integrity testing as required. Some regulations require that you keep a record of inspections, testing, and repairs.

Here are some things to look for when inspecting aboveground secondary containment or diked areas:

- ☑ Are cracks forming or joints crumbling? Is the surface coating intact?
- ☑ Are the base or walls stained? Are any of the containers leaking?
- ☑ Do you see any precipitation or spilled material? Is any liquid touching the containers?
- ☑ Are any metal surfaces corroded?
- ☑ Are the precipitation removal valves and drains functioning properly?
- ☑ Is the area sufficiently protected against vandalism or trespassers?
- ☑ Is there any debris in the area?
- ☑ Are the containers arranged to allow required aisle width?
- ☑ Are drainage systems or trenches blocked?
- ☑ If outside, is there any erosion, excessive weed or other vegetative growth, or unhealthy or stressed vegetation present?
- ☑ Is the storage area properly labeled?

**Protection and Security:** Access to the containment system needs to be restricted to protect against tampering or trespassers, yet it must allow for routine employee and emergency personnel and equipment entry. The flammable and combustible liquid regulations specify aisle widths, spacing distances between storage tanks, and limit the stacking of containers. There are isolation distances from property lines and streets, alleys, or other public ways, and sources of ignition which must be met. Ignition sources include open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static;



electrical and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions; and radiant heat. Storage areas must also meet the applicable fire resistance rating for the volume and class of materials stored. It may be necessary to post the area with "No Smoking" signs. The area should be protected from temperature extremes and from precipitation whenever possible. In addition, the storage area must be kept free of weeds and other debris.

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**Ventilation and Lighting:** The containment area must be adequately ventilated to avoid the buildup of explosive or flammable fumes and to protect workers entering the area. This ventilation can be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside the building. See the flammable and combustible liquid regulations for ventilation rates. Without adequate ventilation, a secondary containment area could become a confined space. These spaces are regulated by the Department of Consumer & Industry Services. The area should also be properly lighted for safety and to deter vandalism.

**Loading and Unloading:** Safe material handling in and out of the containment system and in the dock area must be considered when building secondary containment. These areas need to have safe approaches, like ramps, to avoid worker injury and to avoid spillage of containers as the substances are moved in and out of the area. Consider how trucks, dollies, and forklifts will enter the area if they are used to move containers. Avoid excessive sill height which would hinder movement in and out of the area. However, the flammable and combustible liquid regulations do include specific curb heights if you are storing those types of materials.

You should also consider truck access and maneuvering room. There must be some provision made to prohibit any spilled material in a dock area from entering public sewers, drainage systems, or waterways. This can be accomplished by not having any drains in the truck well and by providing diking around the dock area. If drains are present, they should be equipped with traps, separators, or have locking lids or caps. It is also recommended that materials and absorbents capable of blocking the drain should be kept nearby in case the need arises. Some companies manufacture drain covers for this purpose.

Besides following the regulatory requirements, you may find it helpful or even necessary to hire professional assistance in designing and constructing your secondary containment system. Check the yellow pages for environmental engineering or consulting firms. You may also want to consider asking similar companies what they are using and what, if any, changes they would make if they were designing a new containment system. Remember, the purpose of secondary containment is to provide environmental and worker protection...not just to meet another regulatory requirement!



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## How else can I prevent spills?

Spills can usually be prevented by using common sense and being careful when storing and transferring materials. All containers must be compatible (which means it does not react) with the material stored in the containers, must be free of leaks, and kept closed when not in use. Additional tips include:

- ✓ Train all personnel in spill prevention techniques. Some regulations indicate who at a minimum must be trained regarding handling hazardous material and waste.
- ✓ Practice safe product loading and unloading procedures.
- ✓ Have inventory control procedures — track material from receipt to disposal.
- ✓ Post warning and instructional signs in appropriate places.
- ✓ Adequately label all containers.
- ✓ Use pumps or funnels to transfer liquids.
- ✓ Keep lids and covers on containers to control spills and evaporation.
- ✓ Use seal-less pumps.
- ✓ Install spill basins or dikes in storage areas.
- ✓ Install splash guards and drip boards on tanks and faucets.
- ✓ Use drip buckets under liquid spigots.
- ✓ Prohibit outside draining or replacement of fluids over the ground or on pavement not designed for containment.

You might also be able to reduce the damage caused by spills if you notice them quickly. Routinely check your business for leaks and spills of hazardous substances. Some of the regulations specify how often you must monitor your business. Watch for strange odors and discoloration or corrosion of walls, work surfaces, ceilings, and pipes. Also note if anyone has irritation of their eyes, nose, or throat. All of these can indicate the presence of leaks or poorly maintained equipment.

Another way to reduce your chance of spills is to use safer, alternative materials. There are many resources available that provide suggestions for pollution prevention and waste minimization. Contact your trade association, the US Environmental Protection Agency, or the DEQ Environmental Assistance Division, Pollution Prevention Section for more information.

## What do I need to do if I find leakage into the containment area?

Collected materials will need to be removed as quickly as possible to avoid overflow. It will be necessary to determine if the precipitation and/or other fluids collected would be hazardous waste. If so, then that fluid would have to be managed under Part 111 of 1994 PA 451 requirements. If the fluid is not hazardous waste, you may be able to discharge it to a municipal wastewater sewer system if you have their **prior permission**. Otherwise, you will

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need to hire a licensed waste hauler to pump out the material and haul it to a licensed treatment, storage, or disposal facility.

Spill reporting requirements vary with the different materials. Know what is required to be reported before a spill occurs. If contamination occurs because of a spill, it will be necessary to clean up the site. Check the regulations and discuss the requirements with the appropriate DEQ district office staff.

### **What do I need to do if I want to stop using a storage area?**

Your requirements will depend on what you were storing and how it was stored. Many of the regulations are too complex to adequately summarize in this document so you need to talk to the regulating agency for specific requirements.

If you are a **hazardous waste generator**, the requirements vary depending on whether containers or tanks were used to store the hazardous waste. The accumulation area must be closed in a manner that will result in no further maintenance and that will control any future release of hazardous waste or related substances. You will need to remove or decontaminate all waste residues, equipment, structures, and soils. In addition, you will need to properly handle any waste generated according to the applicable regulations. It is necessary to keep written documentation of your closure activities. Contact your DEQ Waste Management Division district office for more information about closing accumulation areas or transfer locations.

A general practice for closing a container accumulation area includes the following:

- Ensure that all the cracks and joints are sealed to prevent the rinsewater and any contamination from seeping into the soil.
- Scrub any solid residues or stained areas in the storage pad until the stains are no longer visible.
- Triple-rinse, at a minimum, with high-pressure steam or other appropriate cleaning techniques to decontaminate the area.
- Determine if the rinsewater is a hazardous waste before disposing. If it is hazardous waste, then handle it according to Part 111 of 1994 PA 451. Depending on the situation, you might be able to discharge that rinsewater to a municipal wastewater system if you have their **prior permission** or it will need to be hauled by a licensed waste transporter.

If the facility was a **hazardous waste treatment, storage, or disposal facility (TSDF)**, the site must be closed in a manner that will result in no further maintenance and that will control any future release of hazardous waste or related substances. TSDFs have more operating and closure requirements than hazardous waste generators. **Licensed facilities** will need to follow the closure plan identified in the license and notify the DEQ Waste

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Management Division at least 45 days prior to closure. If the facility was *never licensed* (i.e., *interim status*), then you will need to prepare and submit a closure plan and follow the appropriate closure procedures for your facility. Before “closing” a site, talk to the DEQ Waste Management Division permit engineer to determine what will be necessary. In addition, you must notify DEQ staff at least six working days before starting any closure activities to enable staff scheduling time to sample or observe activities. Laboratory testing may be needed to determine if contamination exists. If contamination exists, you will be required to clean up the site.

If the site involves a **regulated UST**, close it according to Parts 211 and 213 of 1994 PA 451. There are two types of closures for regulated USTs — temporary and permanent. Discuss these requirements with staff from the DEQ Underground Storage Tank Division district office.

If the site involves a **regulated AST**, close it according to 1941 PA 207. This includes tanks that will be out of service for more than 12 months. You will be required to have the tank emptied of all liquid, cleaned to a vapor-free condition, and safeguarded against trespassing. Oversight of these requirements was transferred to the DEQ Underground Storage Tank Division from the Michigan State Police, Fire Marshal Division on October 1, 1997.

If the area was used for **storage of other hazardous substances**, you will need to make sure the site is not contaminated. If it is, then you will need to clean it up according to Part 201 of 1994 PA 451 requirements. Contact the DEQ Environmental Response Division district office staff for more information about determining if contamination is present and any cleanup requirements.

## Example of Hazardous Waste Container Storage Area

Example 1 shows how to decide if an outdoor container storage area has enough secondary containment for 200 55-gallon drums of liquid hazardous and non-hazardous wastes. See Figure 1 for a floor plan and details of the storage area.

### Container Storage Area Details and Calculations:

First, calculate the total volume of the storage slab and sump. This will give an initial secondary containment volume for the area.

#### 1. Slab (Initial Volume)

Length of Slab = 50 Feet: Inner Wall to Inner Wall  
Width of Slab = 50 Feet: Inner Wall to Inner Wall  
Height of Shortest Retaining Wall = 1.17 Feet: 14 Inch Center Curb  
Volume of Slab = 2,925 Cubic Feet  
(Estimated by the Formula for a Cube: Length x Width x Height)  
Now convert to Gallons by multiplying Cubic Feet by 7.48

21,879.00 Gallons

#### 2. Sump (Volume Added)

Diameter of Sump = 2 Feet  
Cross Sectional Area of Sump ( $3.14 \times \text{Radius Squared}$ ) = 3.14 Square Feet  
(Radius =  $1/2 \times$  the Diameter of the Sump)  
Depth to the Bottom of the Sump = 2.50 Feet  
Volume of Sump = 7.85 Cubic Feet  
(Estimated by the Formula for a Cylinder: Cross Sectional Area x Height)  
Now convert to Gallons by multiplying Cubic Feet by 7.48

58.72 Gallons

Next, calculate the volume displaced by items placed or constructed within the storage area, including a ramp and the drums to be stored.

#### 3. Ramp (Volume Displaced)

Length of Ramp = 10 Feet  
Width of Ramp = 5 Feet  
Height of Ramp = 1.17 Feet  
Volume Displaced by Ramp = 29.25 Cubic Feet  
(Estimated by the Formula for a Wedge:  $1/2 \times \text{Length} \times \text{Width} \times \text{Height}$ )  
Now convert to Gallons by multiplying Cubic Feet by 7.48

218.79 Gallons

#### 4. Drums Stored (Volume Displaced)

Total Number of 55-Gallon Drums Stored = 200 Drums  
Diameter of One 55-Gallon Drum = 2 Feet  
Area taken Up by One 55-Gallon Drum =  $3.14 \times \text{Radius Squared}$  = 3.14 Square Feet  
(Radius =  $1/2 \times$  the Diameter of a Drum.)  
Height of Portion of Drum that is at or Below Height of Shortest Wall = 1.17 Feet  
Volume Displaced by 200 Drums Stored = 734.76 Cubic Feet  
(1 Drum Volume Estimated by the Formula for a Cylinder: Cross Sectional Area x Height)  
Now convert to Gallons by multiplying Cubic Feet by 7.48

5,496.00 Gallons

Finally, calculate lost volume from precipitation, since the area is outside and with no run-on controls. The Michigan worst case for run-on is a 24-hour rainfall event that happens once every 25 years: about 4.5 inches of rain.

#### 5. Precipitation (Volume Lost)

Rainfall from a 25-Year, 24-Hour Storm Event = 4.5 Inches  
(Divide by 12 Inches to Convert to Feet = 0.38 Feet)  
Volume of Water in Slab Area from Rainfall = 950 Cubic Feet  
(Estimated by the Formula for a Cube: Length of Slab x Width of Slab x Rainfall in Feet)  
Now convert to Gallons by multiplying Cubic Feet by 7.48

7,106.00 Gallons

Now calculate the volume available to contain leaks and spills from drums stored in the area by taking the initial area volume and subtracting item displacement volumes and lost volume from precipitation.

**6. Net Volume Available for Secondary Containment**

Volume Available =

(Slab Volume + Sump Volume - Ramp Volume - Drums Stored - Precipitation)

9,116.93 Gallons

**Required Containment Capacity**

Hazardous waste regulations require secondary containment for containers to contain 100 % of the largest container stored in the area or 10 % of the total amount of wastes stored in the area. Therefore, use the authorized waste storage capacity of the area and multiply it by 10 % and then compare the result to the largest container to find out how much containment is required. In this case, the largest container is 55 gallons, and the total authorized storage capacity is 200 55-gallon drums or 11,000 gallons.

Total Authorized Waste Storage for this Storage Area = 11,000 Gallons

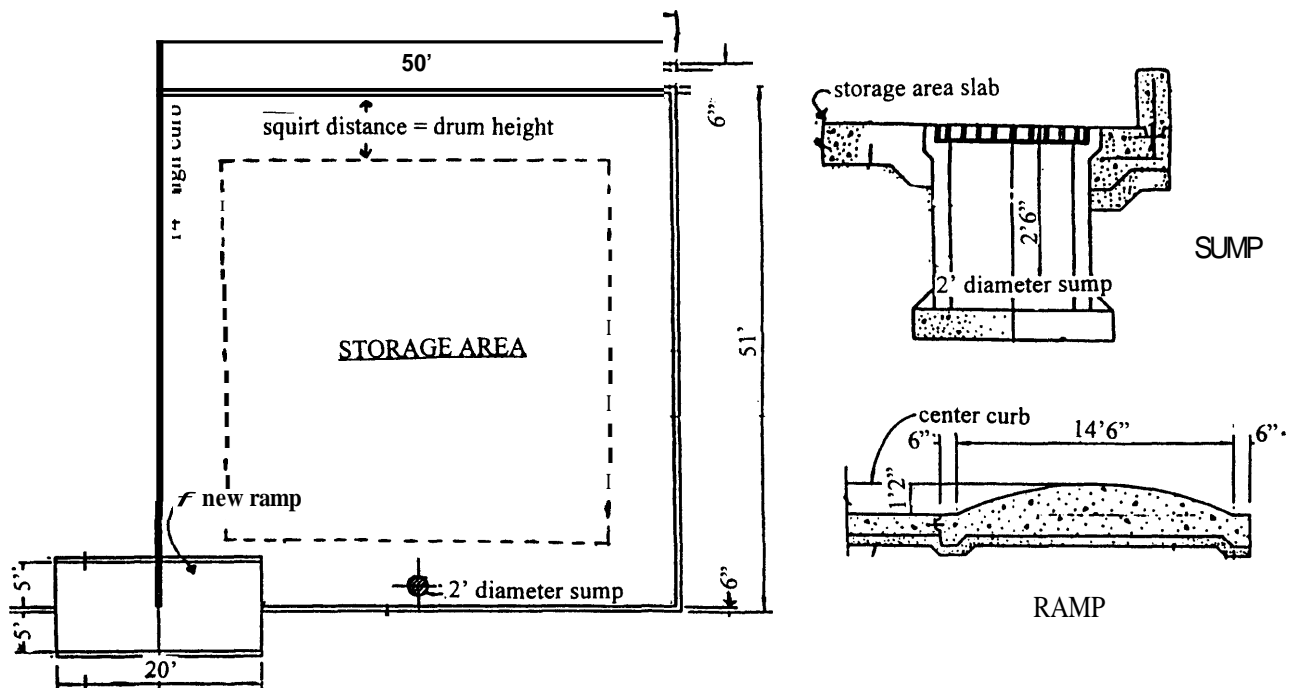
Largest Container in Storage Area = 55-Gallon Drum

Total Authorized Waste Storage x 10 % (0.1 x 11,000 Gallons)

1,100.00 Gallons

The required containment capacity is 1,100 Gallons, which is less than the 9,117 Gallons available for containment. Therefore, the secondary containment is adequate, as long as it is sufficiently impermeable and free of cracks and gaps to contain leaks and spills from the wastes stored.

Figure 1



## Example of Hazardous Waste Aboveground Tank Farm

Example 2 shows how to decide if an outdoor tank farm has adequate secondary containment. See Figure 2 for a floor plan and details of the tank farm.

### Tank Farm Details and Calculations:

First, calculate the total volume of the tank farm's slab and sump. This will give an initial secondary containment volume.

#### 1. Slab (Initial Volume)

Length of Slab = 37 Feet: Inner Wall to Inner Wall.

Width of Slab = 22 Feet: Inner Wall to Inner Wall.

Height of Shortest Retaining Wall = 4 Feet

Volume of Slab = 3,256 Cubic Feet

(Estimated by the Formula for a Cube: Length x Width x Height)

Now convert to Gallons by multiplying Cubic Feet by 7.48

24,354.88 Gallons

#### 2. Sump (Volume Added)

Length of Sump = 2 Feet

Width of Sump = 2 Feet

Depth of Sump = 2 Feet

Volume of Sump = 8 Cubic Feet

(Estimated by the Formula for a Cube: Length x Width x Depth)

Now convert to Gallons by multiplying Cubic Feet by 7.48

59.84 Gallons

Next, calculate the volume displaced by the tanks within the tank farm.

#### 3. 6,000 Gallon Tank (Volume Displaced)

Tank Diameter = 10 Feet

Tank Radius (1/2 x Diameter) = 5 Feet

Height of Portion of Tank at or Below Height of Shortest Wall = 4 Feet

Volume Displaced by 6,000 Gallon Tank = 314 Cubic Feet

(Estimated by the Formula for a Cylinder:  $3.14 \times \text{Tank Radius Squared} \times \text{Height}$ )

Now convert to Gallons by multiplying Cubic Feet by 7.48

2,348.72 Gallons

#### 4. 8,000 Gallon Tank (Volume Displaced)

Tank Diameter = 12 Feet

Tank Radius (1/2 x Diameter) = 6 Feet

Height of Portion of Tank at or Below Height of Shortest Wall = 4 Feet

Volume Displaced by 8,000 Gallon Tank = 452.16 Cubic Feet

(Estimated by the Formula for a Cylinder:  $3.14 \times \text{Tank Radius Squared} \times \text{Height}$ )

Now convert to Gallons by multiplying Cubic Feet by 7.48

3,382.16 Gallons

Finally, calculate lost volume from precipitation, since the tank farm is outside with no run-on controls. The Michigan worst case for run-on is a 24-hour rainfall event that happens every 25 years: about 4.5 inches of rain.

#### 5. Precipitation (Volume Lost)

Rainfall from a 25-Year, 24-Hour Storm Event = 4.5 Inches

(Divide by 12 Inches to Convert to Feet = 0.38 Feet)

Volume of Water in Slab Area from Rainfall = 309.32 Cubic Feet

(Estimated by the Formula for a Cube: Length of Slab x Width of Slab x Rainfall in Feet)

Now convert to Gallons by multiplying Cubic Feet by 7.48

2,313.71 Gallons

Now calculate the volume available to contain leaks and spills from tanks in the tank farm by taking the initial tank farm volume and subtracting displaced volumes and lost volume from precipitation.

#### 6. Net Volume Available for Secondary Containment

Volume Available =

(Slab Volume + Sump Volume - 6,000 Gallon Tank - 8,000 Gallon Tank - Precipitation)

**16,370.13** Gallons

### Required Containment Capacity

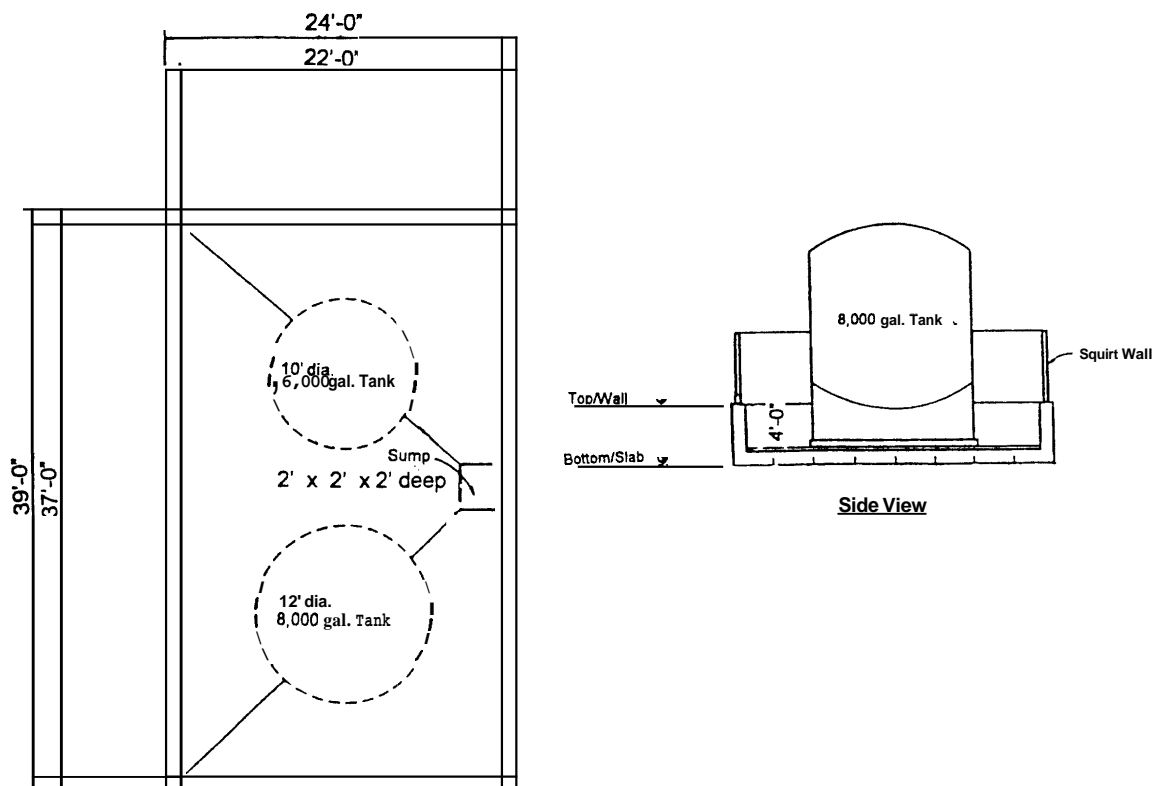
Hazardous waste regulations require secondary containment for tanks to contain 100 % of the largest tank stored in the area. In this case, the largest tank is 8,000 gallons.

Largest Tank in Storage Area =

**8,000.00** Gallons

The required containment capacity is 8,000 Gallons, which is less than the **16,371** Gallons available for containment. Therefore, the secondary containment is adequate, as long as it is sufficiently impermeable and free of cracks and gaps to contain leaks and spills from the wastes stored.

**Figure 2**



Storage Tank Containment Structure

## EXAMPLE OF AN INSIDE STORAGE ROOM

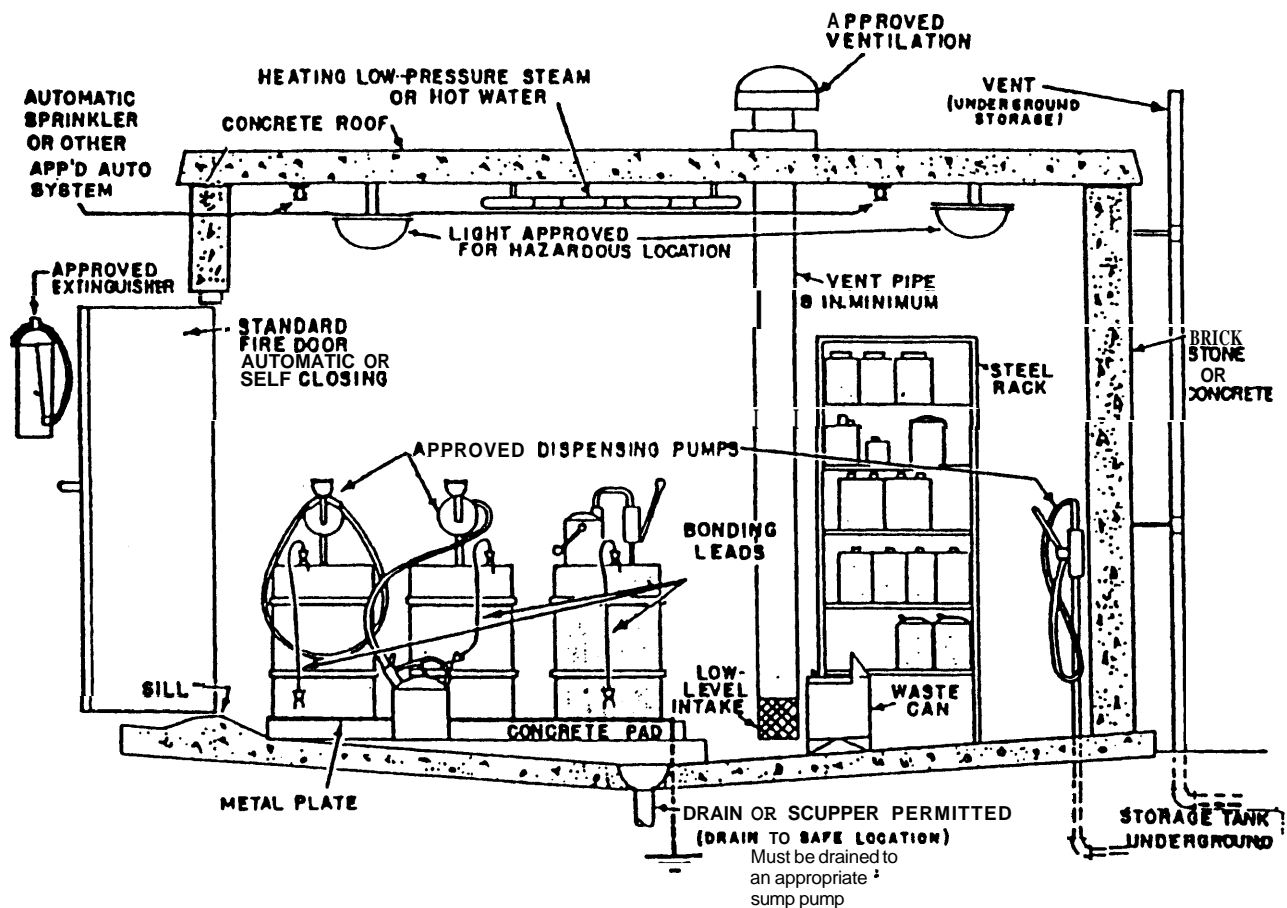
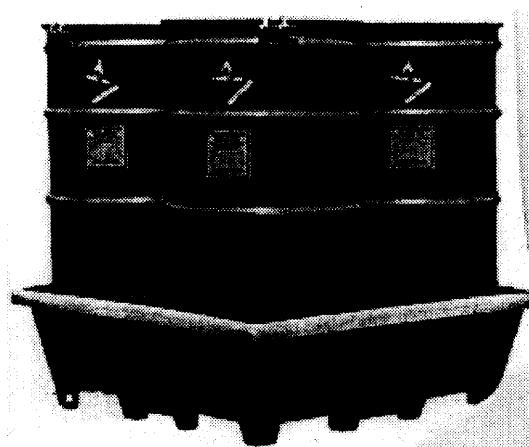
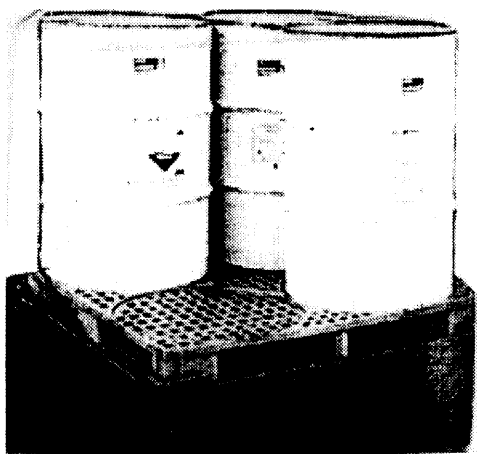
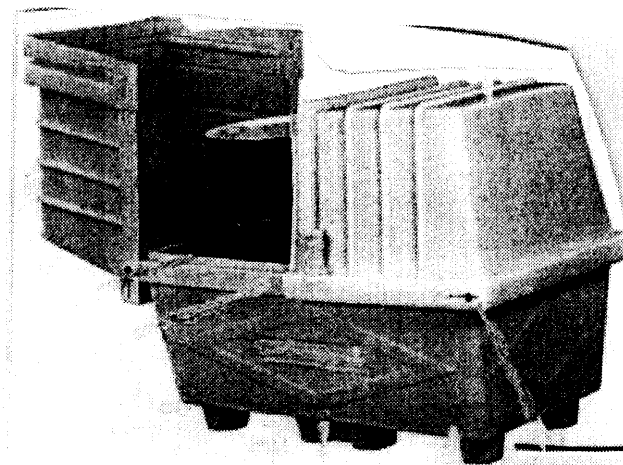
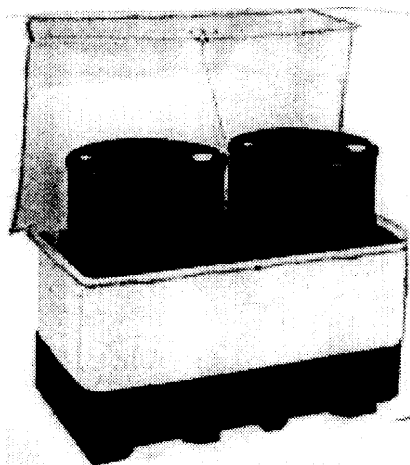


Diagram is from the MIOSHA Safety Education and Training Division document entitled "Onsite Consultation Abatement Method Advice For: Flammable and Combustible Liquids" OSC-113. Refer to this document for additional examples.



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## COMMERCIALLY AVAILABLE EXAMPLES OF PORTABLE SECONDARY CONTAINMENT



These two examples are NOT acceptable for LIQUID hazardous waste storage

<sup>a</sup>Not all portable units will provide adequate squirt protection or meet regulatory requirements. Discuss any questions regarding a unit meeting the requirements with the regulating agency.

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## Where can I get more information?

Only a general overview of the regulations have been included in this document because specific requirements for secondary containment vary with the type of material stored and the regulating agency. Also, regulations may have changed since this document was prepared. You should contact the regulatory agency which oversees your particular storage for the current requirements. For more information contact the following agencies:

**DEPARTMENT OF ENVIRONMENTAL QUALITY**      [www.deq.state.mi.us](http://www.deq.state.mi.us)

For more information about the requirements for your situation, contact the appropriate DEQ division staff at your District Office. See the map on page 31 for locations and telephone numbers. If you are uncertain who to contact, call the Environmental Assistance Center at 800-662-9278.

### REGULATIONS and OTHER DOCUMENTS AVAILABLE ELECTRONICALLY

**PART 31 related:** The Critical Materials Register is available by calling DEQ Surface Water Quality Division (517-373-2190). The Part 5 Rules can be downloaded from the Internet at [www.deq.state.mi.us/swq](http://www.deq.state.mi.us/swq). The Register and Part 5 Rules are also included in the Pollution Incident Prevention Plan guidelines available from the DEQ Waste Management Division district offices.

**PART 111 related:** The state hazardous waste regulations can be downloaded from the Internet at [www.deq.state.mi.us/wmd](http://www.deq.state.mi.us/wmd).

**PART 201 related:** The state cleanup regulations can be downloaded from the Internet at [www.deq.state.mi.us/erd](http://www.deq.state.mi.us/erd).

**PART 211 and 213 related:** The state underground storage tank regulations can be downloaded from the Internet at [www.deq.state.mi.us/ust](http://www.deq.state.mi.us/ust).

### **DEPARTMENT OF CONSUMER & INDUSTRY SERVICES**

<u>Safety Education &amp; Training Division</u>	For safety training, posters, and publications including OSC-113 "Onsite Consultation Abatement Method Advice For: Flammable & Combustible Liquids"	517-322-1809
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<u>Safety Standards Division</u>	For flammable & combustible and other applicable standards	517-322-1845
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**DEPARTMENT OF STATE POLICE, FIRE MARSHAL DIVISION**      517-322-1924

Before 10/1/97, the Fire Marshal had oversight of 1941 PA 207 involving ASTs and storage of hazardous materials. After that date, oversight responsibility transferred to the DEQ, Underground Storage Tank Division.

**U.S. ENVIRONMENTAL PROTECTION AGENCY**      [www.epa.gov/oilspill/index.htm](http://www.epa.gov/oilspill/index.htm)

SPCC Requirements	Region V, Oil Planning and Response Section	312-353-8200
	SPCC Information Hotline	202-260-2342

The federal regulations can be downloaded from [www.cfrs.nvi.net](http://www.cfrs.nvi.net).

**LOCAL CITY, TOWNSHIP, AND COUNTY including zoning, building, fire, and health departments** for any local requirements.



## MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY District Offices

Location, Address, and Telephone Information

